Name:_____ Date:_____

A2&T: Quadratic linear systems

Do Now

1. What is $\sqrt{200x^3y^5z}$ in simplest radical form?

2. Solve for b: $4b^{-\frac{2}{3}} + 9 = 90$

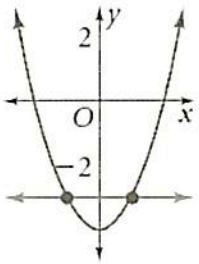
3. Solve the equation for the unknown variable.

$$9^{2b-3} = 27^{1-b}$$

1.

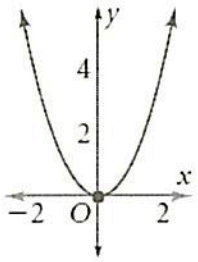
In this lesson, you will study systems of linear and quadratic equations. This type of system can have one solution, two solutions, or no solutions.

$y = x^2 - 4$
$y = -3$



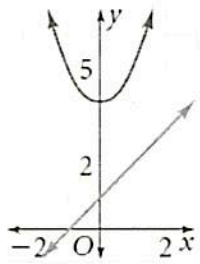
two solutions

$y = x^2$
$y = 0$



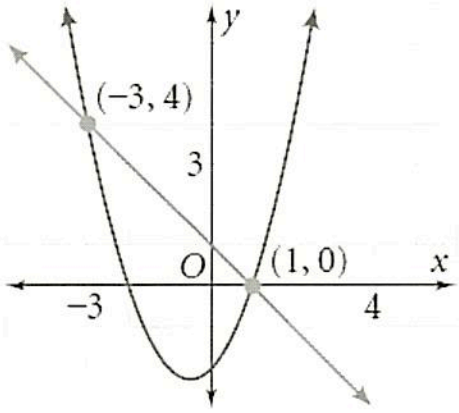
one solution

$y = x^2 + 4$
$y = x + 1$



no solutions

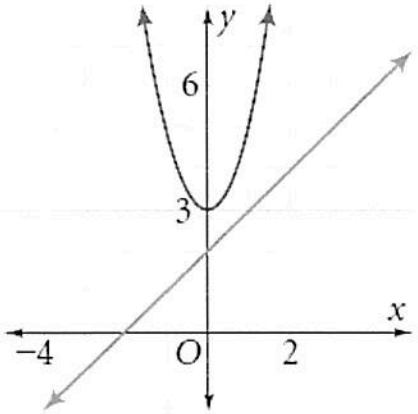
2. Solve the following system by graphing. $y = x^2 + x - 2$
$y = -x + 1$



Graph both equations on the same coordinate plane.
Identify the point(s) of intersection, if any.

The points $(-3, 4)$ and $(1, 0)$ are the solutions of the system.

3. Find the number of solutions for the system. $y = 2x^2 + 3$
$y = x + 2$



Step 1 Graph both equations on the same coordinate plane.

Step 2 Identify the point(s) of intersection, if any.

There are no points of intersection, so there is no solution to the system of equations.

4.

Solve the following system of equations: $y = x^2 - 11x - 36$
$y = -12x + 36$

Step 1 Eliminate y.

$$\begin{array}{rll} & y = x^2 - 11x - 36 & \\ -\ (y = & -12x + 36) & \text{Subtract the two equations.} \\ \hline & 0 = x^2 + x - 72 & \text{Subtraction Property of Equality} \end{array}$$

Step 2 Factor and solve for x

$$\begin{array}{rll} & 0 = x^2 + x - 72 & \\ & 0 = (x + 9)(x - 8) & \text{Factor.} \\ x + 9 = 0 & \text{or} \quad x - 8 = 0 & \text{Zero-Product Property} \\ x = -9 & \text{or} \quad x = 8 & \end{array}$$

Step 3 Find the corresponding y values. Use either equation.

$$\begin{array}{ll} y = x^2 - 11x - 36 & y = x^2 - 11x - 36 \\ y = (-9)^2 - 11(-9) - 36 & y = (8)^2 - 11(8) - 36 \\ y = 81 + 99 - 36 & y = 64 - 88 - 36 \\ y = 144 & y = -60 \end{array}$$

The solutions are $(-9, 144)$ and $(8, -60)$.

5.

Solve the following system of equations: $y = x^2 - 6x + 9$ and $y + x = 5$.

Step 1 Solve $y + x = 5$ for y.

$$y + x - x = 5 - x \qquad \text{Subtract } x \text{ from both sides.}$$
$$y = 5 - x$$

Step 2 Write a single equation containing only one variable.

$$y = x^2 - 6x + 9$$
$$5 - x = x^2 - 6x + 9 \qquad \text{Substitute } 5 - x \text{ for } y.$$
$$5 - x - (5 - x) = x^2 - 6x + 9 - (5 - x) \qquad \text{Subtract } 5 - x \text{ from both sides.}$$
$$0 = x^2 - 5x + 4$$

Step 3 Factor and solve for x.

$$0 = (x - 4)(x - 1) \qquad \text{Factor.}$$
$$x - 4 = 0 \quad \text{or} \quad x - 1 = 0 \qquad \text{Zero-Product Property}$$
$$x = 4 \quad \text{or} \quad x = 1$$

Step 4 Find the corresponding y-values. Use either equation.

$$y = -x^2 + 4x + 1 \qquad y = -x^2 + 4x + 1$$
$$= -(4^2) + 4(4) + 1 \qquad = -(1^2) + 4(1) + 1$$
$$= 1 \qquad = 4$$

The solutions of the system are $(4, 1)$ and $(1, 4)$.

Practice

Solve each system by graphing. Find the number of solutions for each system.

1. $y = x^2 + 1$
$y = x + 1$

2. $y = x^2 + 4$
$y = 4x$

3. $y = x^2 - 5x - 4$
$y = -2x$

4. $y = x^2 + 2x + 4$
$y = x + 1$

5. $y = x^2 + 2x + 5$
$y = -2x + 1$

6. $y = 3x + 4$
$y = -x^2$

Solve each system using elimination.

7. $y = -x + 3$
$y = x^2 + 1$

8. $y = x^2$
$y = x + 2$

9. $y = -x - 7$
$y = x^2 - 4x - 5$

10. $y = x^2 + 11$
$y = -12x$

11. $y = 5x - 20$
$y = x^2 - 5x + 5$

12. $y = x^2 - x - 90$
$y = x + 30$

Solve each system using substitution.

13. $y = x^2 - 2x - 6$
$y = 4x + 10$

14. $y = 3x - 20$
$y = -x^2 + 34$

15. $y = x^2 + 7x + 100$
$y + 10x = 30$

16. $-x^2 - x + 19 = y$
$x = y + 80$

17. $3x - y = -2$
$2x^2 = y$

18. $y = 3x^2 + 21x - 5$
$-10x + y = -1$